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Update on validation of MW L1B and L2

1. HSB measurements vs. chilled-mirror sondes.
Chilled-mirror profiles yield obs-calc differences for HSB much smaller than dedicated RS-90 sondes, which in turn are much better than synoptic raobs.

2. Ta/Tb from raobs.
Sidelobe corrections based on antenna patterns are larger than 1-obs/calc based on raobs for comparable channels.

3. Ocean-surface bias before and after removal of tuning for ch. 15-20.
Removal of tuning adjustments for water vapor reduced the surface brightness bias for oceans. Total water vapor increased by a few precip. mm on average in the MW retrieval, as a result.

4. Non-precipitating cloud liquid water compared to AMSR (ocean only).
There is a subset of light clouds for which AMSU/HSB liquid water is much smaller than AMSR-E. Overall, the rms difference is slightly less than the simulated retrieval error.

5. Revised surface model.

HSB L1 Validation

Observed* Ta - calculated Tb for HSB, using ARM-SGP RS-90 sondes

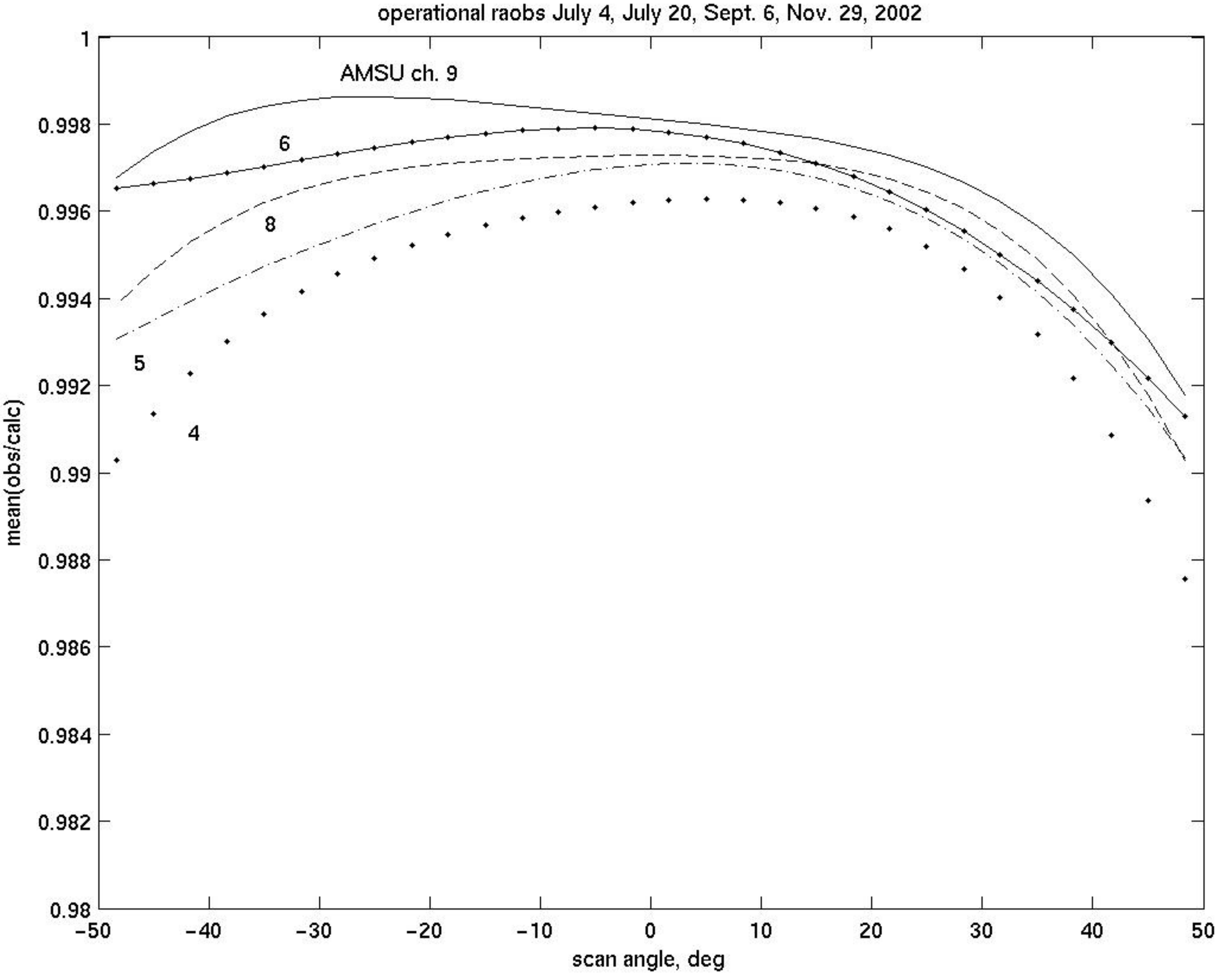
channel	frequency, GHz	N	mean(obs-calc), K	σ(obs-calc), K
HSB 3	183.3 +- 1	60	-0.896	2.205
HSB 4	183.3 +- 3	59	-0.469	1.243
HSB 5	183.3 +- 7	59	-0.274	0.990

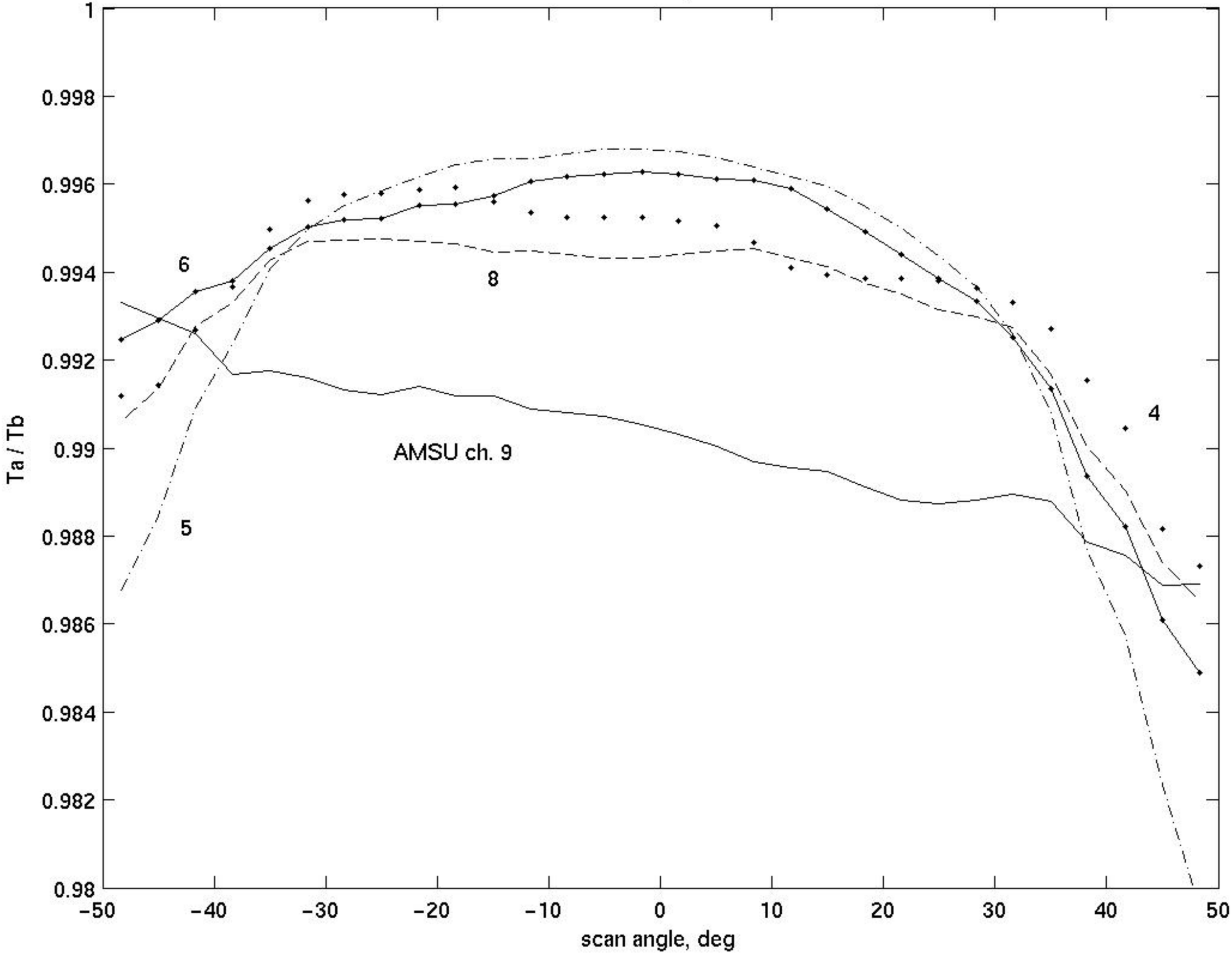
*selected to minimize distance

Observed* Ta - calculated Tb for HSB, using Voemel chilled-mirror sondes

channel	frequency, GHz	N	mean(obs-calc), K	σ(obs-calc), K
HSB 2	150	28	0.205	1.146
HSB 3	183.3 +- 1	32	-0.411	1.256
HSB 4	183.3 +- 3	30	-0.291	0.936
HSB 5	183.3 +- 7	27	-0.253	0.588

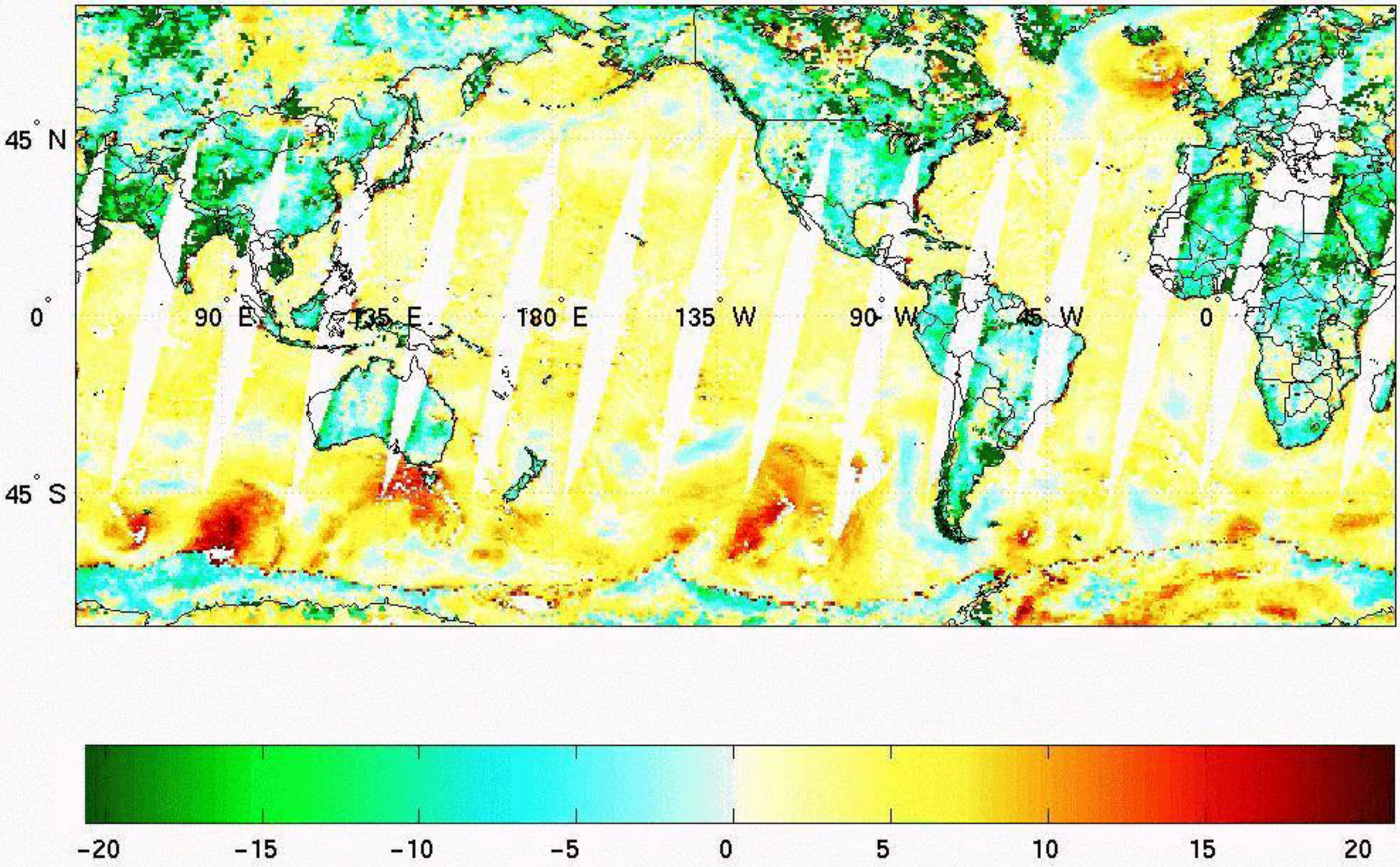
* within 40km, selected to minimize $(\text{distance}/50\text{km})^2 + (\text{landfrac}/0.1)^2$


operational raobs July 4, July 20, Sept. 6, Nov. 29, 2002
AMSU ch. 9
6
8
5
4
mean(obs/calc)
1
0.998
0.996
0.994
0.992
0.99
0.988
0.986
0.984
0.982
0.98
−50
−40
−30
−20
−10
0
10
20
30
40
50
scan angle, deg


sidelobe correction, L1B v3.2.2.1
AMSU ch. 9
6
8
4
5
Ta / Tb
scan angle, deg
1
0.998
0.996
0.994
0.992
0.99
0.988
0.986
0.984
0.982
0.98
−50
−40
−30
−20
−10
0
10
20
30
40
50

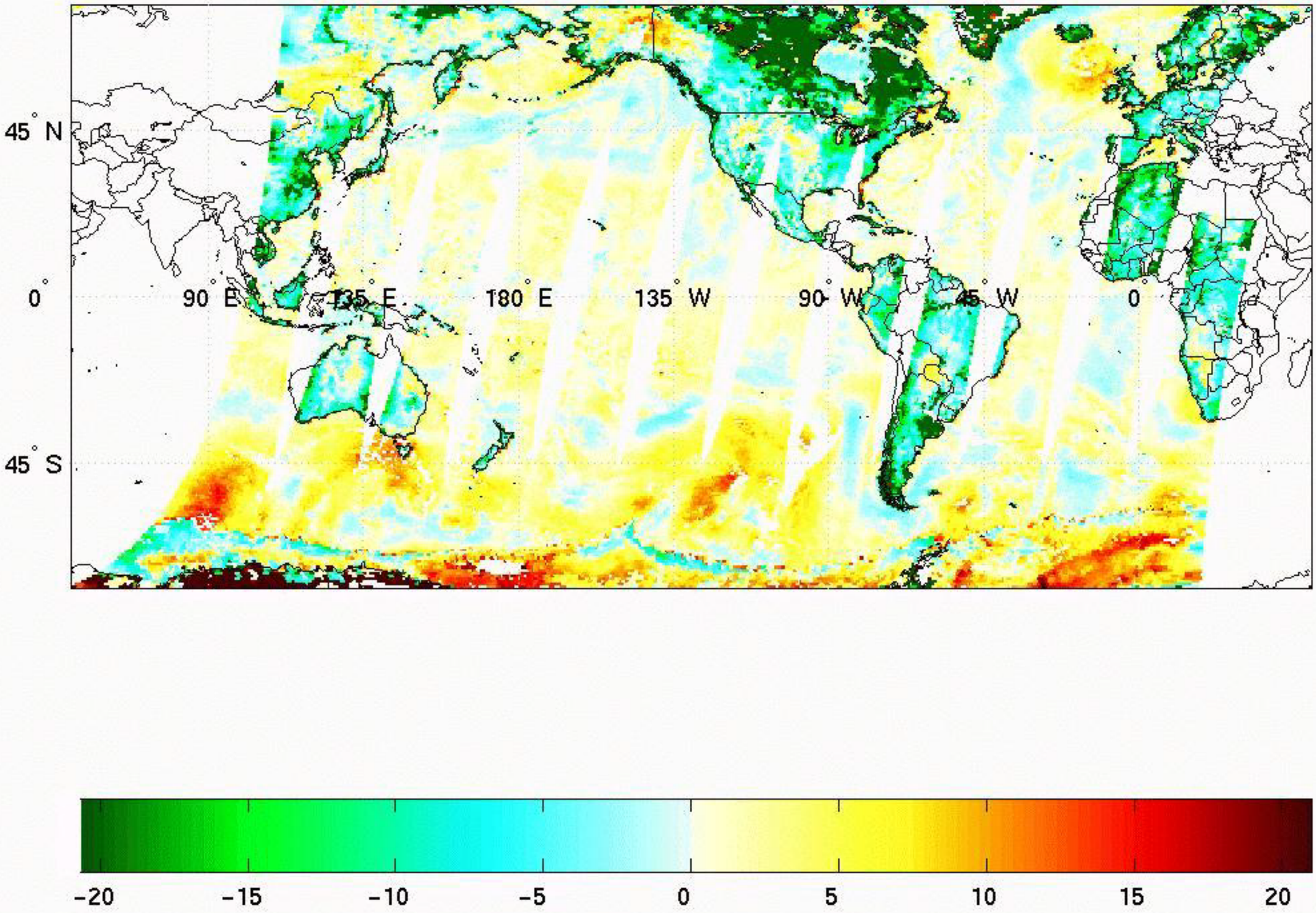
v.3.0.1.0

surface T_o Sept. 6, 2002 descending



v.3.1.9.0

surface To Sept. 6, 2002 descending



Sept. 6, 2002 AIRS v.3.2.1.1 vs. AMSR v.3 int. cloud liquid

rms diff. = 0.043 mm

all rain excluded

AMSU/HSB cloud liquid, mm

AMSR cloud liquid, mm

0 0.05 0.1 0.15 0.2 0.25 0.3 0.35 0.4 0.45 0.5

Surface model revised

Frozen surface types: Retrieval adjusts the surface brightness in 3 spectral ranges, with transition frequencies that depend on the surface classification.
Ocean, coast & dry land: 2 spectral ranges, as before.

Land, ice, snow: Surface scattering is Lambertian.
Ocean & coast: Quasi-specular reflection (unchanged).